STECHKIN, S. B.

USSR/Mathematics - Approximations,   May/Jun 51
Optimum

"The Order of the Best Approximations of Continuous Functions," S. B. Stechkin

"Iz Ak Nauk SSSR, Ser Matemat" Vol XV, No 3, pp 219-242

Investigates best approximation of continuous periodic functions by means of trig polynomials. Gives necessary and sufficient conditions so the best approximation may possess given (deg) order of decrease. Cf. G. Jackson, "The Theory of Approximation," 1930, NY, and A. Zygmund, "Smooth Functions," "Duke Math Jour" 12, 1945, pp 47-76. Submitted by Acad S. N. Bernshteyn 11 May 50.

186T50

STECHKIN, S.B.

APPROVED FOR RELEASE: 08/25/2000   CIA-RDP86-00513R001653020014-9

Stechkin, S. B. On absolute convergence of orthogonal series. I. Mat. Sbornik N.S. 29(71), 225–232 (1951). (Russian)

Let $f(x)$ be a continuous function of period 2π, $E_n(f)$ its best approximation by trigonometric polynomials of order $n-1$, $\omega(\delta, f)$ its modulus of continuity. S. Bernstein proved that the Fourier series of $f(x)$ converges absolutely if either $\sum n^{-1}E_n(f)$ or $\sum n^{-1}\omega(n^{-1}, f)$ converges [C. R. Acad. Sci. Paris 199, 397–400 (1934)]. The author shows first that these two conditions are equivalent. He then extends the first theorem (and its generalizations) to more general orthogonal series. Let $\{n_k\}$ be an increasing sequence of integers, $F(u)$ an increasing concave function vanishing at 0. Theorem 2. If $f \in L^2$ and c_n are its Fourier coefficients with respect to the orthonormal system $\phi = \{\phi_n(x)\}_{n=1}^{\infty}$, then

$$\sum F(c^2_{n_k}) \le 2 \sum F(k^{-1}\{E^{(2)}_k[f, \phi]\}^2),$$

where the expression in braces is the mean-square difference between $f(x)$ and the sum of the first $n-1$ terms of its expansion in terms of ϕ. Theorem 3.

$$\sum |c_{n_k}| \le (4/3)^{\frac{1}{2}} \sum k^{-\frac{1}{2}} E^{(2)}_{n_k}[f, \phi].$$

Let $\omega^{(2)}(\delta, f)$ be the mean-square modulus of continuity of f, and a_n, b_n its ordinary Fourier coefficients. Theorem 4. $\sum (|a_{n_k}| + |b_{n_k}|) \le C \sum k^{-\frac{1}{2}} \omega^{(2)}(n_k^{-1}, f)$. Several theorems on absolute convergence of Fourier series follow as corollaries.

The proofs of Theorems 3 and 4 depend on the following inequality: if $u_n \ge 0$, $u_n \ne 0$, $\sum \cdots$ then

$$\sum_{n=1}^{k} u_n < (4/3)^{\frac{1}{2}} \sum_{n=1}^{k} |\cdots|.$$

R. P. Boas, Jr. (Evanston, Ill.).

Source: Mathematical Reviews,   Vol. 13 No. 3

APPROVED FOR RELEASE: 08/25/2000   CIA-RDP86-00513R001653020014-9

STECHKIN, S. B.

Stečkin, S. B. The best approximation of functions repre-
sented by lacunary trigonometric series. Doklady Akad.
Nauk SSSR (N.S.) 76, 33–36 (1951). (Russian).
Let $f(x) \sim \sum (a_k \cos n_k x + b_k \sin n_k x)$ be a function with
a lacunary Fourier series, i.e. $n_{k+1}/n_k = q_k \geq \lambda > 1$; let
$\rho_k^2 = a_k^2 + b_k^2$. Let $s_n(x)$ be the partial sums,

$$R_n = \max_x |f(x) - s_n(x)|;$$

$A_n = \sum_{n_k > n} \rho_k$; E_n the best approximation to f by trigo-
nometric polynomials of order n. S. Bernstein proved that
$E_n = R_n$ for a special choice of n_k [Extremal properties of
polynomials . . ., ONTI, Moscow-Leningrad, 1937, pp.
31–36]. Here the author proves that $C(\lambda)A_n \geq E_n \geq R_n \geq A_n$;
and, if $q_k \to \infty$, $E_n/R_n \to 1$, $R_n/A_n \to 1$.   R. P. Boas, Jr.

Source: Mathematical Reviews.   Vol 12. No. 7

STECHKIN, S. B.

Steckin, S. B. On de la Vallée Poussin sums. Doklady Akad. Nauk SSSR (N.S.) 80, 545–548 (1951). (Russian)

The de la Vallée Poussin sums of a Fourier series with partial sums $s_n(x)$ are

$$\sigma_{n,m}(x) = (m+1)^{-1} \sum_{k=n-m}^{n} s_k(x).$$

The author investigates in more detail than has previously been done the Lebesgue constants $N_{n,m}$ for these sums, $N_{n,m} = \sup \|\sigma_{n,m}(x,f)\|$ for $f(x)$ continuous with $\|f\| \leq 1$, the norm being the maximum. Among the results are the following. If $n_p \geq m_p \to \infty$ (even integers) and

$$r_p = 2(n_p+1)/(m_p+1) - 1 \to r < \infty$$

then

$$N_{n_p,m_p} \to 2\pi^{-1} \int_0^\infty |\sin rt \cdot \sin t| \, t^{-2} \, dt.$$

As a function of $(n+1)/(m+1)$, $N_{n,m}$ is increasing and concave. There is the following asymptotic formula generalizing that for the ordinary Lebesgue constants $(m=0)$:

$$N_{n,n} = \frac{4}{\pi^2} \left\{ \log \frac{n+1}{m+1} + 2 \sum_{\nu=1}^\infty \frac{\log \nu}{4\nu^2 - 1} + 3 \log 2 + \gamma \right\} + O\left(\frac{m+1}{n+1}\right).$$

R. P. Boas, Jr. (Evanston, Ill.).

Source: Mathematical Reviews,   Vol   13 No. 4

STECHKIN, S. B.

USSR/Mathematics - Approximations, Opti- 11 Apr 52

"The Best Approximations of Periodic Functions by Trigonometric Polynomials," S. B. Stechkin, Math Inst imeni Steklov, Acad Sci USSR

"Dok Ak Nauk SSSR" Vol LXXXIII, No 5, pp 651-654

Considers continuous periodic function $f(x)$; its best approximations $E_n(f)$ $(n=1,..)$ by means of trigonometric polynomials of order $n-1$; and its modulus $v_k(d,r)$ of continuity of k-th order. Previous investigations indicate that $E_n(f) \sim n^{-a}$ if $v_k \sim d^a$ (d is a small pos fraction). A natural problem

USSR/Mathematics - Approximations, Opti- 11 Apr 52
mum (Contd)

arises here. Whether it is impossible to demonstrate the equivalence of the condition $E_n(f) \sim n^{-a}$ in classi- cal terms of the moduli of continuity of $f(x)$ and its deriv. Subject problem is studied here. Submitted by Acad S. N. Bernshteyn 11 Feb 52.

218T56

STECHKIN, S. B.

Mathematical Reviews
Vol. 14 No. 10
Nov. 1953
Analysis

7-13-54   LL

Stečkin, S. B. On absolute convergence of Fourier series. Izvestiya Akad. Nauk SSSR. Ser. Mat. 17, 87–98 (1953). (Russian)

A well-known theorem of S. Bernstein [C. R. Acad. Sci. Paris 199, 397–400 (1934)] states that if the periodic function $f(x)$ has modulus of continuity $\omega(\delta, f)$, if (1) $\omega(\delta, f) = O(\omega(\delta))$, and (2) $\sum n^{-1}\omega(1/n)$ converges, then the Fourier series of $f(x)$ converges absolutely. The author gives a complete solution of the problem suggested by Bernstein's theorem: he constructs a certain majorant $\omega^*(\delta)$ of $\omega(\delta)$ and shows that (1) implies the absolute convergence of the Fourier series if and only if $\sum n^{-1}\omega^*(1/n)$ converges. The more difficult part of the theorem is, of course, the construction of a counterexample when the series diverges. To construct the majorant ω^*, put

$$\omega^{(0)}(0) = 0, \quad \omega^{(0)}(\delta) = \inf_{\delta \leq \eta \leq \pi} \omega(\eta) \quad (0 < \delta \leq \pi);$$

then

$$\omega^{(1)}(\delta) = \inf_{0 \leq h \leq \delta} \{\omega^{(0)}(h) + \omega^{(0)}(\delta - h)\} \quad (0 \leq \delta \leq \pi),$$

and $\omega^{(k)}(\delta)$ $(k > 1)$ is obtained in the same way from $\omega^{(k-1)}(\delta)$. Finally, $\omega^{(k)}(\delta)$ decreases to a limit as $k \to \infty$, and this limit is $\omega^*(\delta)$.   *R. P. Boas, Jr.* (Evanston, Ill.).

STECHKIN, S. V.

USSR/Mathematics - Approximation,   Sep/Oct 53
                  Remainder

"Evaluation of the Remainder of the Taylor Series for Certain Classes of Analytic Functions," S. V. Stechkin, Math Inst im Steklov, Acad Sci USSR

Iz Ak Nauk SSSR, Ser Mat, Vol 17, No 5, pp 461-472

Studies the behavior of the remainders of the Taylor series for functions $F(z)=\sum_{k=0}^{\infty} a_k z^k$ analytic in the circle $|z|=1$ and satisfying in this circle the condition $/F^{(n)}(z)/ \leq 1$ for a certain natural number r. In particular, he establishes the asymptotic formula for the upper boundary of the n-th remainder of the

274T70

Taylor series extended to all z of the circle $|z| = 1$ and all functions $F(z)$ for which $/F^{(r)}(z)/ \leq 1$ ($/z/ < 1$). Presented by Acad A. N. Kolmogorov, 16 Dec 52.

STECHKIN, S. B.

274773

USSR/Mathematics - Fourier Series   Nov/Dec 53

"The Kolmogorov-Seliverstov Theorem," S. B. Stechkin, Math Inst im Steklov, Acad Sci USSR

Iz Ak Nauk SSSR, Ser Mat, Vol 17, No 6, pp 499-512

Gives new formulations and establishes local analogs of the Kolmogorov-Seliverstov theorem. Cites related work of N. K. Bari, "Generalization of the Inequalities of S. N. Bernshteyn and A. A. Markov," (DAN, Vol 90, 1953). Presented by Acad S. N. Bernshteyn, 23 Oct 52.

STECHKIN, S. B.

USSR

I - F/W

MS
62

Stečkin, S. B. Some remarks on trigonometric poly-
nomials. Uspehi Mat. Nauk (N.S.) 10, no. 1(63), 159–
166 (1955). (Russian)

Let $K_n(t) = \frac{1}{2}a_0 + \sum_{k=1}^{n} a_k \cos kt$. It is known that there
are constants C_1, C_2 such that

$$\left| \sum_{k=0}^{n} \frac{a_k}{n-k+1} \right| \leq C_1 \int_0^{\pi} |K_n(t)| \, dt,$$

$$\sum_{k=0}^{n} \frac{|a_k|}{n-k+1} \leq C_2 \int_0^{\pi} |K_n(t)| \, dt$$

[Hille and Tamarkin, Trans. Amer. Math. Soc. 34, 757–783
(1932); Sidon, J. London Math. Soc. 13, 181–183 (1938)].
The author shows that $C_1 \leq \int_0^{\pi} x^{-1} \sin x \, dx = 1.85 \cdots$, while
$C_2 \leq 2$; and that under the additional requirement that
$a_k \geq 0$, the exact value of C_2 is $\pi/2$. He comments on the
calculation of $\int_0^{\pi} |K_n(t)| \, dt$ by complex-variable methods and
illustrates his remarks by obtaining a new formula for the
Lebesgue constants.   R. P. Boas, Jr. (Evanston, Ill.).

STECHKIN, S. B.

Steckin, S. B.   On absolute convergence of Fourier series. II. Izv. Akad. Nauk SSSR. Ser. Mat. 19 (1955), 221–246. (Russian)

[Part I appeared in the same Izv. Ser. Mat. 17 (1953), 87–98; MR 14, 974.] Let A denote the class of periodic functions with (everywhere) absolutely convergent Fourier series. Given a class M of periodic continuous functions, the author asks: (1) Does M contain functions not in A? (2) Does M contain functions f such that $\bar{f}$ (the conjugate function) is also in M but f is not in A? (3) Does M contain an f such that the Fourier series of f and of $\bar{f}$ have no point of absolute convergence? (4) Same as (3) with both f and $\bar{f}$ in M. The author answers all these questions affirmatively for two kinds of classes, one defined by best trigonometric approximation and the other defined by a condition on a modulus of continuity. He investigates (2) and (4) for the equivalent case of power series F. Let $E_n(F)$ denote the best approximation to $F(z)$, assumed continuous in $|z|\leq 1$, by polynomials of degree $n-1$. His first theorem is that $E_n(F)=O(G_n)$ implies $F \in A$ if and only if $\sum n^{-1}G_n$ converges. The kth modulus of continuity $\omega_k(\delta, f)$ is defined by replacing $\Delta_h F(x)$ by $\Delta_h{}^k F(x)$ in the usual definition. Then the author shows that under certain restrictions on $\omega(\delta)$, the condition $\omega_k(\delta, F)=O(\omega(\delta))$ implies $F \in A$ if and only if $\sum n^{-1}\omega(1/n)$ converges. The same is true with no restriction (except positivity) on $\omega(\delta)$ provided that $\omega(\delta)$ is replaced by the rectified function

Stegun, S.B.

$$\omega_k{}^{**}(\delta)=\delta^k \inf_{0<\eta<\delta} \{\eta^{-k} \inf_{\eta \leq \xi \leq \eta} \omega(\xi)\}.$$

Thus (2) (and hence (1)) is answered affirmatively for the classes defined by requiring either $\sum n^{-1}G_n$ divergent or $\sum n^- \omega_k{}^{**}(1/n)$ divergent. Finally the author constructs examples to show that the answer to (4) (and hence (3)) is affirmative for both these classes. R. P. Boas, Jr.

APPROVED FOR RELEASE: 08/25/2000   CIA-RDP86-00513R001653020014-9

USSR/ Mathematics - Orthogonal series

Card 1/1   Pub. 22 - 9/49

Authors   :   Stechkin, S. B.

Title   :   On the absolute convergence of orthogonal series

Periodical   :   Dok. AN SSSR 102/9, 37-40, May 1, 1955

Abstract   :   An analysis and a solution of the absolute convergence problem for an
                  element $f \in L^2$ are presented. One considers the conditions for the
                  element f under which the series $\sum |c_n|$ converges. The L^2 is the
                  Hilbert space in which the

                  $$\Phi \equiv \{\varphi_n\}$$

                  is the orthogonal basis and the $n = 1,2\ldots\ldots$. The solution of the pro-
                  blem is based on a theorem which was proved by the author earlier. The
                  theorem appeared in the Am. Math. Society Magazine (1953). Eight referen-
                  ces: 1 Germ., 2 USA and 5 USSR (1935-1953).

Institution :   The Acad. of Scs., USSR, V. A. Steklov Mathematical Institute

Presented by :   Academician M. A. Lavrentiev, January 11, 1955

APPROVED FOR RELEASE: 08/25/2000   CIA-RDP86-00513R001653020014-9"

Call Nr: AF 1108825

Transactions of the Third All-union Mathematical Congress   (Cont.) Moscow,
Jun-Jul '56, Trudy '56, V. 1, Sect. Rpts., Izdatel'stvo AN SSSR, Moscow, 1956, 237 pp.
Sofronov, I. D. (Moscow). On Approximate Solution of
Singular Integral Equations.   102-103

Stechkin, S. B. (Moscow). Problem of Absolute Convergence
of the Orthogonal Series.   103

There is 1 USSR reference.

Suvorov, G. D. (Tomsk). On the Continuity of Univalent
Mappings of   Arbitrary Closed Regions.   103-104

Mention is made of Lavrent'yev, M. A.

Suyetin, P. K. (Ural'sk). On Polynomials, Which are
Orthogonal in Area.   105

Talalyan, A. A.(Yerevan). On the Convergence Almost
Everywhere of Orthogonal Series.   105

Card 32/80

STECHKIN, S.B.

Bari, N. K.; and Steckin, S. B. *Best approximations and differential properties of two conjugate functions*. Trudy Moskov. Mat. Obšč. 5 (1956), 483–522. (Russian)

Let $f(x)$ be a continuous function of period 2π and $\bar{f}(x)$ its conjugate. The paper investigates relations between various differential properties of f and $\bar{f}$ and the best approximations $E_n(f)$, $E_n(\bar{f})$ of f and $\bar{f}$ by trigonometric polynomials of order $\leq n$. It has points of contact with previous papers of the authors [see Bari, Izv. Akad. Nauk SSSR. Ser. Mat. 19 (1955), 285–302; MR 17, 256; Steckin, ibid. 20 (1956), 197–206; MR 17, 1079]. Given any integer $k \geq 1$, let $\omega_k(\delta, f)$ be the modulus of continuity of f of order k:

$$\omega_k(\delta, f) = \max_{|h| \leq \delta} \max_{x} \left| \sum_{j=0}^{k} (-1)^{k-j} C_k^j f(x+jh) \right|;$$

we write ω for ω_1. A function $\varphi(t)$, $0 \leq \delta \leq \pi$, is said to belong to class Φ, if φ is continuous, non-decreasing, 0 at the origin and positive elsewhere. A $\varphi \in \Phi$ is said to belong to class B, if $\sum_{n+1}^{\infty} \nu^{-1}\varphi(\nu^{-1}) = O\{\varphi(1/n)\}$, and to class B_k ($k = 1, 2, \cdots$) if $\sum_1^n \nu^{k-1}\varphi(\nu^{-1}) = O\{n^k\varphi(1/n)\}$. The following are the main results of the paper. 1) If $\varphi \in B$, r is a non-negative integer, then all the relations

Math. Inst. im V. A. Steklov, AS USSR

Bari, N. K., and Steckin, S. B.

(*) $\qquad E_n(f^{(p)}) = O\{n^{-(r-p)}\varphi(1/n)\},$

(**) $\qquad E_n(f^{(q)}) = O\{n^{-(r-q)}\varphi(1/n)\},$

where $p, q = 0, 1, \cdots, r$, are equivalent. 2) Condition B is necessary for the validity of (*) and (**) for all f. 3) Let k be positive, r non-negative, both integers, and suppose that $\varphi \in B$, $\varphi \in B_k$. Then the four relations (*), (**) and

(†) $\omega_{k+r-s}(\delta, f^{(s)}) = O\{\delta^{r-s}\varphi(\delta)\}, \omega_{k+r-m}(\delta, f^{(m)}) = O\{\delta^{r-m}\varphi(\delta)\}$

where $p, q, r, s = 0, 1, \cdots, r$, are all equivalent. 4) The preceding propositions hold if the relations '$=O$' are replaced by '$\sim$' (we write $A_n \sim B_n$ if the ratios A_n/B_n and B_n/A_n are bounded). 5) Suppose that $\varphi \in B$ and $\varphi(\delta)/\delta$ decreases; then the relations $\omega(\delta, f) = O[\varphi(\delta)]$ and $\omega(\delta, f) = O[\varphi(\delta)]$ are equivalent if and only if φ satisfies both conditions B and B_1. $\qquad$ A. Zygmund.

KOLMOGOROV, A.N.; STECHKIN, S.B.

Sergei Mikhailovich Nikol'skii; on the fiftieth anniversary of
his birthday. Usp.mat.nauk 11 no.2:239-244 Mr-Ap '56. (MLRA 9:8)
(Nikol'skii, Sergei Mikhailovich, 1905-) (Bibliography--
--Mathematics)

STECHKIN, S.B.

Best approximation of conjugate functions by means of trigonometric
polynomials. Izv.AN SSSR.Ser.mat. 20 no.2:197-206 Mr-Ap '56.
(MLRA 9:11)

1. Matematicheskiy institut imeni V.A. Steklova Akademii nauk SSSR.
Predstavleno akademikom S.L. Sobolevym.
(Functions, Continuous)
(Approximate computation)

STECHKIN, S. B.

Steckin, S. B. On absolute convergence of Fourier series.
Izv. Akad. Nauk SSSR. Ser. Mat. 20 (1956), 385-412.
(Russian)

A sequence of positive integers $n_1 < n_2 < \cdots$ is said to belong to the class $\mathfrak{N}$ if there is an $A > 1$ such that for any integer $n > 0$ the number of representations of n in the form

$$n = \pm n_{k_1} \pm n_{k_2} \pm \cdots \pm n_{k_s} \quad (k_1 < k_2 < \cdots < k_s)$$

does not exceed A^s $(s = 1, 2, \cdots)$. A sequence which is the union of a finite number of sequences of the class $\mathfrak{N}$ is said to be of the class $\mathfrak{N}_\sigma$. The main result of the paper is that if $\{n_k\}$ is of the class $\mathfrak{N}_\sigma$, and if

$$(*) \qquad \sum (a_{n_k} \cos n_k x + b_{n_k} \sin n_k x)$$

is the Fourier series of a function bounded above (or below), then $\sum (|a_{n_k}| + |b_{n_k}|)$ is finite. This generalizes a previous result of Sidon [Acta Univ. Szeged. Sect. Sci. Math. 10 (1943), 206-253; MR 8, 150] who made a stronger assumption about $\{n_k\}$, namely that it is the union of a finite number of lacunary (in the sense of Hadamard) sequences. Another result of the present paper is that if $\{n_k\}$ is the union of a finite number of lacunary

Steckin, S.B.

sequences, and (*) is the Fourier series of a continuous function f, then the ratio of any two numbers $E_n(f)$, $R_n(f)$, $A_n(f)$ is contained between two positive numbers independent of n, where $E_n(f)$ is the best approximation of f by trigonometric polynomials of order n, and

$$R_n(f)=\max_n \left| \sum_{n_k>n} (a_{n_k}\cos n_k x + b_{n_k}\sin n_k x)\right|,$$

$$A_n(f)=\sum_{n_k>n} |a_{n_k}| + |b_{n_k}|).$$

A. Zygmund (Chicago, Ill.).

2/2

STECHKIN, S.B.

SUBJECT   USSR/MATHEMATICS/Fourier series
AUTHOR   STECKIN S.B.
TITLE   On the best approximation of some classes of periodic functions
              by trigonometric polynomials.
PERIODICAL   Izvestija Akad.Nauk 20, 643-648 (1956)
              reviewed 1/1957

Let $\psi_r(x, \alpha) = \sum_{k=1}^{\infty} k^{-r} \cos(kx - \frac{\alpha\pi}{2})$, $r > 0$, α-real. Let $W^{(r)}(\alpha)$ (resp. $W_1^{(r)}(\alpha)$)

denote the class of continuous (resp. summable) periodic functions $f(x)$ which admit the representation

$$f(x) = \frac{a_0}{2} + \frac{1}{\pi} \int_0^{2\pi} \psi_r(x-t, \alpha) \varphi(t) dt,$$

where $\int_0^{2\pi} \varphi(t) dt = 0$ and $\|\varphi\|_M = \sup_t \text{ess} |\varphi(t)| \leq 1$ (resp. $\|\varphi\|_L = \int_0^{2\pi} |\varphi(t)| dt \leq 1$).

Let $\widetilde{W}^{(r)} = W^{(r)}(r+1)$ and $\widetilde{W}_1^{(r)} = W_1^{(r)}(r+1)$.
If the function f belongs to the class H and if it is approximated by trigono-
metric polynomials t_{n-1}, then $E_n(f) = \min_{t_{n-1}} \max_x |f(x) - t_{n-1}(x)|$ is called the

ε
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$\ldots = 2-r$: $\ldots$ The author proves $\sup_{f \in H} E_n(f)$ is the best
in the present paper that for

$$E_n\left[W^{(r)}(\alpha)\right] = \frac{4}{\pi} K_r \frac{1}{n} \ldots$$

$$E_n\left[W^{(r)}\right] = \frac{4}{\pi} K_r \cos \frac{r\pi}{2} n^{-r}, \qquad (n=1,2,\ldots)$$

where $K_r = \sum_{j=0}^{\infty} \frac{1}{(2j+1)^{r+1}}$.

INSTITUTION: Math.Inst.Acad.Sci.

STECHKIN, S.B.

SUBJECT   USSR/MATHEMATICS/Theory of functions   CARD 1/2   PG - 578
AUTHOR   STECKIN S.B.
TITLE   An extremal problem for polynomials.
PERIODICAL   Izvestija Akad.Nauk 20, 765-774 (1956)
              reviewed 2/1957

Let $0 < p < 2$ and the sequence $D \equiv \{d_n\}$ be non-negative: $d_n \geq 0$ $(n=0,1,2,\ldots)$.

CARD 2/2   PG - 578

$$C_1 \left\{ \sum_{k=0}^{n} d_k^2 \right\}^{1-\frac{p}{2}} \leq M_n^{(p)}[D] \leq C_2 \left\{ \sum_{k=0}^{n} d_k^2 \right\}^{1-\frac{p}{2}} .$$

As an application of this result the author proves the theorem: Let $0 < p < 2$, $d_n \geqslant 0$ ($n = 0,1,2,\ldots$) and

$$\sum_{n=0}^{\infty} d_n^2 = \infty .$$

Then there exists a function

$$F(z) = \sum_{n=0}^{\infty} c_n z^n$$

being regular in $|z| < 1$ and continuous in $|z| \leq 1$, for which

$$\sum_{n=0}^{\infty} d_n^{2-p} |c_n|^p = \infty.$$

INSTITUTON: Math.Inst. Acad. Sci.

ZUKHOVITSKIY,S.I.; STECHKIN, S.B.

Approximation of abstract functions with values in banach space.
Dokl.AN SSSR 106 no.5:773-776 F '56.   (MLRA 9:7)

1.Lutskiy pedagogicheskiy institut imeni Lesi Ukrainki i Matemati-
cheskiy institut imeni V.A.Steklova Akademii nauk SSSR.Predstavleno
akademikom N.N.Bogolyubovym.

(Functions) (Spaces, Generalized)

GRADSHTEYN, I.S. (Moscow) ROFE-BEKETOV, F.S. (Khar'kov); MINLOS, R.A. (Moscow)
        SKOPETS, Z.A. (Yaroslavl'); GEL'FOND, A.O. (Moscow); YAGLOM, A.M.
        (Moscow); ROBINSON, R.M. (SShA); DUBNOV, Ya.S. (Moscow); STECHKIN,
        S.B. (Moscow)

        Problems of higher mathematics. Mat. pros. no.1:224-227 '57.
                                                        (MIRA 11:7)

            (Mathematics--Problems, exercises, etc.)

SUBJECT   USSR/MATHEMATICS/Theory of approximations   CARD 1/1   PG - 756
AUTHOR   SUCHOWIZKIJ S.I., STECKIN S.B.
TITLE   On the approximation of abstract functions.
PERIODICAL   Uspechi mat.Nauk 12, 1, 187-191 (1957)
             reviewed 5/1957

The present paper contains a survey of several generalizations of the
classical Cebyšev approximation by polynomials of a function which is given
on a compactum Q. These generalizations have been found by Kolmogorov and
the authors. For the case of some infinite-dimensional abstract spaces and
in spaces of finite dimension the existence, uniqueness and conditions of such
approximations are considered.

S T e c H K i M, S B

PA - 2366

AUTHOR: STECHKIN,S.B.
TITLE/   On the Fourier Coefficients of Continuous Functions. (O koef-
                fitsientakh Fur'ye nyepryerywnykh funktsiy, Russian).
PERIODICAL: Itvestiia Akad. Nauk SSSR, Ser. Mat., 1957, Vol 21, Nr 1,
                pp 93 - 116 (U.S.S.R.)
                Received: 4 / 1957   Reviewed: 5 / 1957

ABSTRACT: It is the task of this paper to find out in the case of what
                restrictions in the system of the not negative functions $\{\phi_n(u)\}$
                there exists the continuous function with the period 2

$$f(x) \sim \sum_{n=0}^{\infty} \rho_n \cos(nx - \alpha_n) \quad (\rho \geqslant 0), \text{ in which } \sum_{n=1}^{\infty} \phi_n(\rho_n) = \infty$$

It is said in the preface that partical research work with re-
spect to the properties of the Fourier coefficient

$$f(x) \sim \frac{\alpha_n}{2} + \sum_{n=1}^{\infty}(a_n \cos nx + b_n \sin nx) = \sum_{n=0}^{\infty} \rho_n \cos(nx - \alpha_n),$$

where $\rho_n \geqslant 0$, was first carried out in 1918 by Karleman, who prov-
ed that a continuous function $f(x)$ exists, and that
$\sum_{n=1}^{\infty} \rho_n^{2-\varepsilon} = \infty$ applies in the case of any $\varepsilon = 0$. Karleman's work
was then continued by such scientists as Gronwall, Banakh, Sidon,
Palej, and Stetschkin.

Card 1/3

PA - 2366

On the Fourier Coefficients of Continuous Functions.

In the paragraph "1.Theorems on Number Series" the divergence
of the series of Fourier coefficients of Taylor coefficients of
continuous functions is dealt with. It is assumed that $\{\phi_n(u)\}$
is a system of not negative functions, and the problem is then
investigated as to when the number sequence r_n exists which sat
satisfies the following conditions:

$$r_n \geqslant 0, \quad \sum_{n=1}^{\infty} r_n^2 < \infty, \quad \sum_{n=1}^{\infty} \phi_n(r_n) = \infty \quad (1.1)$$ By means of 20 formulae,

which follow, the following conclusion is arrived at: With

$$0 < p < 2, \quad \phi_n(u) \geqslant 0 \quad (u \geqslant 0), \quad \phi_n(u)\uparrow, \quad u^{-p}\phi_n(u)\downarrow \quad (n=1,2,\ldots)$$ it

is necessary and sufficient for the existence of a number series
$\{r_n\}$ which satsifies the conditions (1,1) that the series

$$\sum_{n=1}^{\infty} d_n^e$$ be divergent. Here d_n is a radical of the equation

$\phi_n(d_n)=d_n^e$. In paragraph "2.Lemmas on Number Series" the result

$$\sum_{k=M+1}^{N} d_K^{2-p} r_K^n < \sum_{K=M+1}^{N} \phi_K(r_K) + \frac{B^p}{1-\frac{p}{2}} \left\{ \sum_{K=M+1}^{N} d_K^2 \right\}^{1-\frac{p}{2}}$$

Card 2/3

is obtained by means of solving 16 formulae, and herefrom it
follows that, if the series $\{\phi_K(u)\}$ is infinite and satisfies

On the Fourier Coefficients of Continuous Functions.   PA - 2366
the condition (A) the series $\sum_{M=1}^{\infty} u_n^2(\xi)$ diverges for arbitrary $\xi > 0$, then
$\sum_{K=M+1}^{\infty} d_K^2 = \infty$. Paragraph "3. Basic Theorems" (Some suggestions
concerning the divergence of series which are dependent on the
coefficients of Taylor's series). Paragraph 4 deals with "individual
cases" taken from the preceding paragraph (Theorem by Gronwall
and theorem by Palej).

ASSOCIATION: Not given
PRESENTED BY: Member of the Academy A.N. Kolmogorow
SUBMITTED: 10.1.1956
AVAILABLE: Library of Congress.

Card 3/3

On Trigonometric Series Which Diverge in Every Point   38-5-6/6

$$U(x) = \sum_{n=1}^{\infty} (a_n \sin n x - b_n \cos n x)$$

with coefficients

$$a_n, \ b_n = 0(\alpha_n)$$

which diverge in each point.

Theorem: For each sequence of positive numbers $\{\alpha_n\}$, $\alpha_n \downarrow 0$, $\sum \alpha_n^2 = \infty$ there exists such a power series

$$S(z) = \sum_{n=o}^{\infty} c_n z^n \ , \qquad c_n = 0(\alpha_n)$$

that the trigonometric series

$$T(x) = \text{Re}\left\{ e^{i\beta} S(e^{ix}) \right\}$$

diverges everywhere for each real β .

ASSOCIATION: Math. Inst. im. V.A. Steklov, USSR Acad. Sc. (Matematicheskiy institut im. V.A. Steklova, AN SSSR)

PRESENTED: By A.N. Kolmogorov, Academician
SUBMITTED: April 25, 1957

AVAILABLE: Library of Congress

CARD 2/2

Dissertations, Branch of Physico-Mathematical Sciences.   3o- 58-4-29/44
July-December 1957.

2) At the Institute for Geophysics imeni O. Yu. Shmidt
(Institut fiziki Zemli imeni O. Yu. Shmidta) the following
dissertations for the degree of a Doctor of Physico-Mathe=
matical Sciences were defended:
I. K. Ovchinnikov - Screening Influence of the Topmost
Layer of the Earth's Crust in the Electric Prospecting
of Ore Deposits (Ekraniruyushcheye vliyaniye poverkhnost=
nogo sloya zemnoy kory pri elektrorazvedke rudnykh mesto=
rozhdeniy).
3) At the Mathematical Institute imeni V. A. Steklov
(Matematicheskiy Institut imeni V. A. Steklova) the
following dissertations were defended:
a) for the degree of a Doctor of Physico-Mathematical
Sciences;
I. P. Kubilyus - Some Investigations of the Theory of
Probabilities of Numbers (Nekotoryye issledovaniya po
veroyatnostnoy teorii chisel).
S. B. Stechkin - Investigations of the Theory of Power
Series and of Trigonometric Series (Issledovaniya po
teorii stepennykh i trigonometricheskikh ryadov).

Card 2/4

STECHKIN, S.B.

AUTHOR: YEFIMOV, N.V. and STECHKIN, S.B.   20-118-1-3/58

TITLE: Some Properties of Chebyshev Sets (Nekotoryye svoystva Cheby-
             shevskikh mnozhestv)

PERIODICAL: Doklady Akademii Nauk SSSR, 1958, Vol 118, Nr 1, pp 17-19 (USSR)

ABSTRACT: Let M be a set in the Banach space X. Let the distance
             from $x \in X$ to M be defined by $\rho(x,M) = \inf_{y \in M} \|x-y\|$. The

             set is called a Chebyshev set, if to every $x \in X$ there exists
             exactly one element $y \in M$ so that $\rho(x,M) = \rho(x,y)$.
             Theorem: If the unit sphere of the n-dimensional Banach space
             X_n possesses no conic points, then each bounded Chebyshev set

             $M \subset X_n$ is convex.

             Theorem: In the n-dimensional Banach space X_n the class of the

             bounded Chebyshev sets is identical with the class of the
             bounded convex sets if and only if the unit sphere of X_n is

             strongly convex and contains no conic points.
             For the case of the general Banach space X only some evident
             geometric considerations are given.

Card 1/2

16(1)

AUTHORS: Yefimov,N.V., and Stechkin,S.B.   SOV/20-127-2-5/70

TITLE: Some Supporting Properties of Sets in Banach Spaces and
             Chebyshev Sets

PERIODICAL: Doklady Akademii nauk SSSR,1959,Vol 127,Nr 2,pp 254-257 (USSR)

ABSTRACT: A set M of the metric space R is called a Chebyshev set if to
             every $x \in R$ there exists only one $y \in M$ such that $\varrho(x,y) = \varrho(x,M)$,
             where ϱ denotes the distance. Let X be a Banach space, let E_a be
             a sphere of radius a. The a-closure of the set $M \subset X$ is the inter-
             section of the complements of all open E_a which do not intersect
             M. M is called a-convex if it is identical with its a-closure. It
             is proved that every bounded compact Chebyshev set of a uniformly
             convex and smooth Banach space is convex. The properties of a-
             closures and a-sets are used essentially for the proof.4 theorems
             and 2 lemmas are given altogether. The authors mention Shmul'yan.
             There are 14 references, 3 of which are Soviet, 2 American,
             1 Dutch, 1 Polish, 4 Italian, and 3 Danish.

ASSOCIATION:Moskovskiy gosudarstvennyy universitet imeni M.V.Lomonosova
             (Moscow State University imeni M.V.Lomonosov)

PRESENTED: March 20, 1959, by P.S.Aleksandrov, Academician

SUBMITTED: March 17, 1959

Card 1/1

STECHKIN, Sergey Borisovich -- awarded sci degree of Doc Physico-Math

Sci for the 12 Dec 57 defense of dissertation: "Research on the theory

of stepennykh [lit., graduated; or, possibly, complex] and trigono-

metric series" at the Council, Math Inst imeni Steklov, AS, USSR;

Prot No 8, 12 Apr 58.

(BMVO, 9-58,27)

ZALGALLER, S.I. (Leningrad); SKOPETS, Z.A. (Yaroslavl'); ROFE-BEKETOV, F.S.
    (Khar'kov); LANDIS, Ye.M. (Moskva); LEVIN, V.I. (Moskva); STECHKIN,
    S.B. (Moskva); LYAPUNOV, A.A. (Moskva); ARNOL'D, V.I. (Moskva);
LOPSHITS, A.M. (Moskva)

Problems of higher mathematics. Mat.pros. no.3:270-274 '58.
                                                (MIRA 11:9)
            (Mathematics--Problems, exercises, etc.)

SOV/20-121-4-3/54

AUTHOR: Yefimov, N.V. and Stechkin, S.B.

TITLE: Chebyshev Sets in Banach Spaces (Chebyshevskiye mnozhestva v banakhovykh prostranstvakh)

PERIODICAL: Doklady Akademii nauk SSSR,1958,Vol 121,Nr 4,pp 582-585 (USSR)

ABSTRACT: A set M lying in the metric space R is called a Chebyshev set, if for every $x \in R$ there exists exactly one $y \in M$, so that the distances $\varsigma(x,y)$ and $\varsigma(x,M)$ are equal : $\varsigma(x,y) = \varsigma(x,M)$.

Let X be a strongly convex Banach space, S its unit sphere, L_n an n-dimensional subspace, $x \in S$ an arbitrary point, the distance of which from L_n is $\leqslant \varepsilon < 1$, Λ_{n-1} the (n-1)-dimensional plane parallel to L_n and touching S in x. Let $y_1, y_2 \in L_n$ be those points in which the (n-1)-dimensional tangential plane of S is parallel to Λ_{n-1} (consider the intersection of S and L_n). Let y be that one of the points y_1 and y_2 lying nearer to x. X is called a space with uniformly small obliqueness, if there exists a k, $k > 1$, so that

Card 1/2

Chebyshev Sets in Banach Spaces   SOV/20-121-4-3/54

$\rho(x,y) \leq k\, \mathcal{E}$ for all $x \in S$.

Theorem: A Chebyshev compact in a Banach space with uniform-
ly small obliqueness and with a smooth unit sphere is a con-
vex set.

There are 2 references, 1 of which is Soviet, and 1 Polish.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet imeni M.V. Lomonoscva
              (Moscow State University imeni M.V. Lomonosov)

PRESENTED: April 5, 1958, by I.N. Vekua, Academician

SUBMITTED: April 4, 1958

Card 2/2

STECHKIN, S.B.

Best lacunary systems of functions. Izv. AN SSSR. Ser. mat.
25 no.3:357-366 My - Je '61.   (MIRA 14:6)

1. Matematicheskiy institut imeni V.A. Steklova AN SSSR.
                        (Functional analysis)

33245
S/517/61/062/000/002/003
B102/B138

16-3300

AUTHOR: Stechkin, S. B.

TITLE: Approximation of periodic functions by Fejér sums

SOURCE: Akademiya nauk SSSR. Matematicheskiy institut. Trudy. v. 62.
             1961. Sbornik rabot po lineynym metodam summirovaniya ryadov
             Fur'ye, 48-60

TEXT: The author derives a number of estimates concerning the deviation $\rho_n(f)$ of a 2π-periodic function $f(x) \in C$ from its Fejér sum $\sigma_n(f)$. These estimates depend on the behavior of the sequence $E_\mu(f)$ $(\mu < n)$, where $E_\mu(f)$ is the optimal approximation of f by trigonometric polynomials of the order $\mu-1$. The derivations are based on certain properties of the Vallée Poussin sums $\sigma_{n,m}(x,f) = [1/(m+1)] \sum_{\nu=n-m}^{n} s_\nu(x,f)$, specially on the fundamental property $\|f - \sigma_{n,m}(f)\| \leqslant 2((n+1)/(m+1))E_{n-m+1}(f)$. The most

Card 1/2

20733

16.6100 (also 1031)

AUTHORS: Stechkin,B.S., Academician, and Stechkin,S.B.

TITLE: Mean square value and arithmetical mean

PERIODICAL: Akademii nauk SSSR. Doklady, vol.137, no.2, 1961, 287-290

TEXT: Let $y(x) \in L^2 [0,1]$. Let

$$\varphi_0(x) = y(x), \qquad y_0 = \int_0^1 |\varphi_0(x)| dx,$$

$$\varphi_k(x) = |\varphi_{k-1}(x)| - y_{k-1}, \qquad y_k = \int_0^1 |\varphi_k(x)| dx \qquad (k=1,2,\ldots).$$

The authors prove the formula

$$\int_0^1 y^2(x)dx = \sum_{k=0}^{\infty} y_k^2 = \sum_{k=0}^{\infty} \left\{ \int_0^1 |\varphi_k(x)| dx \right\}^2. \tag{1}$$

The proof is based on
Lemma 1: Let $p > 0$, and on E, mes $E = \delta > 0$, let $|\varphi_p(x)| \geq M$. Then it holds

Card 1/2

28723
S/020/61/140/003/001/020
C111/C222

AUTHORS: Yefimov, N. V., and Stechkin, S. B.

TITLE: Approximate compactness and Chebysev sets

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 140, no. 3, 1961,
             522-524

TEXT: The present paper is a continuation of earlier publications of
the authors (Ref. 1, DAN 118, no. 1, 17, 1958; Ref. 2, DAN 121, no. 4,
582, 1958; Ref. 3, DAN 127, no. 2, 254, 1959). The authors give necessa-
ry and sufficient conditions for the convexity of a Chebyshev set
lying in a uniformly convex and smooth Banach space. The result is
applied to the investigation of the approximate properties of the set
of rational fractions with given straight lines of numerator and
denominator in the spaces $L_p (p > 1)$.

Let X be a real Banach space, M -- subset of X. If $x \in X$, $y_n \in M$ (n=1,2,
...) and $\lim_{n \to \infty} S(x, y_n) = S(x, M)$ then the sequence $\{ y_n \}$ is called
minimizing for x in M. Definition: The set $M \subset X$ is called approximately
compact if for every $x \in X$ every minimizing sequence of elements

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S/020/61/140/003/001/020
Approximate compactness and Chebysev... C111/C222

called a sun in X if it is an existence set (i.e.: for every $x \in X$ the
lower boundary $\inf\limits_{y \in M} \varsigma(x,y)$ is reached on a $y_0 \in M$) and if it has the
following property: let x be an arbitrary point not belonging to M, and
let $y \in M$ be so that $\varsigma(x,M) = \varsigma(x,y)$; for an arbitrary point z of a
ray originating from y and going through x then it holds: $\varsigma(z,M) = \varsigma(z,y)$.

Given $M \subset X$ and $a > 0$; the intersection of the complements of all open
spheres E_a with the radius a which do not intersect M is called the
a-closure of M. The set $M \subset X$ is called a-convex if it is identical
with its a-closure.

Theorem 1: In a uniformly convex space X, the property of an approxima-
tely compact set to be a sun in X is equivalent to the Chebyshev proper-
ty.

Theorem 2: An approximately compact set in a uniformly convex space has
the Chebyshev property then and only then if each of its closed b-ex-
tensions is a-convex for every a > 0.

Card 3/4

STECHKIN, S.B.

Boundedness of nonlinear functionals. Usp.mat.nauk 17 no.1:215-
222 Ja-F '62.   (MIRA 15:3)
                        (Functional analysis)

STECHKIN, S.B.

On a problem of P.L. Ul'ianov, Usp.mat.nauk 17 no.5:143-144
S-O '62.   (MIRA 15:12)
                        (Functions, Continuous)

STECHKIN, S.B.; UL'YANOV, P.L.

Uniqueness sets. Izv.AN SSSR.Ser.mat. 26 no.2:211-222 Mr-Ap
'62.   (MIRA 15:7)

1. Matematicheskiy institut imeni V.A.Steklova AN SSSR i
Moskovskiy gosudarstvennyy universitet imeni Lomonosova.
                    (Aggregates) (Series)

STECHKIN, C.B.

Approximate characteristics of sets in linear normed spaces.
Rev math pures 8 no.1:5-18 '63.

1. Matematicheskiy institut imeni V.A. Steklova Akademii nauk
SSSR.

STECHKIN, S.B.

        Power series and trigonometric series with monotone coefficients.
        Usp.mat.nauk 18 no.1:173-180 Ja-F '63.   (MIRA 16:2)
                                 (Series)

STECHKIN, S.B.

Seminar on the mathematical aspects of gas dynamics.   Usp. mat. nauk
18   no.5:231-232   S-O   '63.   (MIRA 16:12)

STECHKIN, S.B.; TAYKOV, L.V.

    Minimum continuation of linear functionals. Trudy Mat.
    inst. 78:12-23 '65.   (MIRA 18:12)

27646
S/024/61/000/004/003/025
E194/E155

$\gamma_{b},\mathcal{Y}|\mathcal{Y}^{0}$

AUTHORS: Stechkin, V.S., Dubinskiy, M.G., Sokolov, K.K.,
             and Tsao Hsiao Ching   (Moscow)

TITLE: Concerning radial equilibrium of flow

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh
             nauk, Energetika i avtomatika, 1961, No.4, pp. 11-15

TEXT: In designing axial-flow compressors and also turbines
with long blades, it is important to calculate correctly the
velocity distribution in the axial clearances between blades.
There is still no general agreement about the best way of doing
this, although as axial-flow machines have been made of high
efficiency it might appear that published methods of calculation
were acceptable. However, the formulae used in most of the
methods are based on t' so-called equation of 'radial equilibrium'
which is the projection of the equation of motion on the radius
assuming that there is no radial acceleration of the air particles.
This equation together with Bernoulli's equation has been used to
find a differential equation between the axial and tangential
speeds or between the angle of swirl of flow and the absolute speed

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Concerning radial   librium of ...   S/024/61/000/004/003/025
E194/E155

along the radius.   .fortunately, the usual relationship between
the axial and tang   tal speeds is ill-founded, and the
derivation given   sually incorrect. The relationship between
the axial and tan   tial speeds is usually given in the following
form:

$$\frac{d}{dr}\frac{c_z^2}{2} = -\frac{1}{2r^2}\frac{d(c_u r)^2}{dr} \tag{3}$$

Here: $c_u r$ is   tangential component of the velocity; c_r is
the radial com   nt of the velocity; c_z is the axial
component of v   ity; r is the radius.   The article then goes
on to show the   the general case the derivation of Eq.(3) is
erroneous, par   ularly in the method of excluding the pressure
from the rela   ship. Eq.(3) is correct provided that the flow
is axially sy r trical but Stechkin has shown that unless
$c_u r$ = const.   :ion is not axially symmetrical. The velocity
component va j   according to a periodic law with a velocity
discontinui   : discharge from the blades. This discontinuity
may occur i   e case of streamline flow of a non-viscous fluid

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27646

Concerning radial equilibrium of flow   S/024/61/000/004/003/025
                                          E194/E155

and cannot occur in a real viscous fluid, in which the velocity
discontinuity causes a band of turbulence.   Experimental work
was undertaken to study the discontinuity of flow, studying the
direction of flow lines over compressor blading. The group of
blades was made similar to a flat group, but the blades were
twisted through a certain angle according to an arbitrary law.
A plane-parallel flow passed through the group consisting of seven
ducts.   Details of the blade geometry are given.   Flow velocities
of 0.2-0.25 Mach number were used with angles of attack from +9°
to -9° at the mean section.   To determine the instant at which
flow broke away from the back of the blades, measurements were
made of the total pressure distribution immediately beyond the
blades.   Flow lines on each side of the blade were determined with
silk threads and small metal flags, which were photographed.   The
silk threads were found to register the direction of flow only in
the region of laminar flow immediately near the blade surface.
The flags were much more stable, but under conditions where the
flow breaks away the flags on the back of the blades swing about
and may even be reversed under certain conditions.   The tests
showed that in a blade group of this kind jets of air flowing near
Card 3/4

FUKS, N.A.; STECHKINA, I.B.; STAROSEL'SKIY, V.A.

    Determining the distribution of aerosols by size, using the
    diffusion method. Inzh.-fiz.zhur. 5 no.12:100-103 D '62.
                                     (MIRA 16:2)
   1. Fiziko-khimicheskiy institut imeni L.Ya.Karpova, Moskva.
          (Aerosols)   (Particle size determination)

S/020/62/147/005/030/032
B101/B186

AUTHORS: Fuks, N. A., Stechkina, I. B.

TITLE: Theory of fibrous aerosol filters

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 147, no. 5, 1962, 1144-1146

TEXT: This is a discussion on the sedimentation of aerosol particles on a cylindrical fiber, perpendicular to the flow direction, calculated by I. Langmuir (OSRD Rep. N 865 (1942)) and C. N. Davies (Proc. Inst. Mech. Eng., IB, 185 (1952)). Calculations for a system of parallel fibers made by J. Happel (Am. Inst. Chem. Eng. J., 5, 174 (1959)) and S. Kuwobara (J. Phys. Soc. Japan, 14, 527 (1959)) are also discussed. A method given by G. L. Natanson (DAN, 112, 100 (1957)) for an isolated cylinder was applied to calculate the accumulation factor for a system of parallel cylinders under the condition $Pe = 2U_o a/D \gg 1$, where Pe is the Peclet number, D is the diffusion coefficient, U_o is the flow velocity far from the filter, and a is the cylinder radius. Results: $E = 2.9(-0.5 \ln\alpha - \lambda)^{-1/3} Pe^{-2/3}$, where $\alpha = 1 - \mathcal{E} = (a/b)^2$, $\mathcal{E}$ is the filter porosity, and λ is an empirical

Card 1/2

FUKS, N.A.; STECHKINA, I.B.

Resistance of a gaseous medium to the movement of particles
having a size comparable to the mean free path of gas
molecules. Zhur.tekh.fiz. 33 no.1:132-135 Ja '63.

(MIRA 16:2)

1. Nauchno-issledovatel'skiy fiziko-khimicheskiy institut
imeni L.Ya.Karpova, Moskva.
(Molecular dynamics)   (Hydrodynamics)

STECHKINA, I.B.

Diffusion toward a cylinder at low Re and Pe numbers. Inzh.-fiz. zhur.
7 no.8:128-130 A- '64.   (MIRA 17:10)

1. Fiziko-khimicheskiy institut im. L.Ya. Karpova, Moskva.

L 22336-66   EWT(1)/EWT(m)/EWP(j)/T/ETC(m)-6   DS/WW/RO/JK/RM

ACC NR: AP6013901

SOURCE CODE: UR/0020/66/167/006/1327/1330

AUTHOR: Stechkina, I. B.;

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56

ORG: Physicochemical Institute imeni L. Ya. Karpov (Fiziko-khimicheskiy institut) B

TITLE: Diffuse settling of aerosols in fibrous filters

SOURCE: AN SSSR. Doklady, v. 167, no. 6, 1966, 1327-1330

TOPIC TAGS: hydrodynamics, aerosol capture, aerosol diffusion, aerosol filter, aero-dynamics

ABSTRACT: An expansion is presented for Langmuir's and Natanson's formulas for de-termining the capture coefficient η of aerosols in fibrous filters. The usual formula (for small η) in the theory of diffuse settling of aerosols is based on convective diffusion of aerosol particles to the surface of an isolated cylinder or a system of parallel cylinders with a laminar aerosol flow moving perpendicular to the axis of the cylinders is

$$2k\eta = Ae^{\gamma_h},\qquad\qquad (1)$$

where A is a numerical coefficient, $\varepsilon = 4k/Pe$, k is a hydrodynamic factor equal to (2.0 —ln Re) for an isolated cylinder and (-1/2 ln α—λ) for a system of cylinders, α is the packing density of the system, λ is a numerical coefficient on the order of

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UDC: 541.1

L 22336-66

ACC NR: AP6013901

0.6, and Pe = $2U_0a/D$ is the Peclet number (U is the rate of flow across the cylinders, α is the radius of the cylinder, and D is the particle diffusion coefficient). A partial differential equation is derived for convective diffusion expressed in dimensionless coordinates for inertialess particles in a cylinder oriented perpendicular to the flow. The solution of this equation is sought in the form $n = n_0 + \varepsilon^{1/3}n_1 + \varepsilon^{1/3}n_2 + \dots$ with the final formula derived being

$$2k\eta = 2.30\varepsilon^{1/3} + 0.312\varepsilon + O(\varepsilon^{1/3}). \qquad (2)$$

with this formula the capture coefficient for aerosol particles can be calculated accurately to terms on the order of $\varepsilon^{1/3}$ and it is described as valid for values of ε down to 0.05. The same procedure can be used to compute higher terms of the expansion, but this involves cumbersome computations of integrals. The author thanks Professor N. A. Fuks for discussing the work. Orig. art. has: 19 formulas.   [EO]

SUB CODE: 01, 20/ SUBM DATE: 08May65/ ORIG REF: 002/ OTH REF: 003/ ATD PRESS:
4242

Card 2/2

1. TERENT'EV, A. P., VOLODINA, M. A., PANTELEIMONOV, I. A., STECHKINA, I. M.

2. U.SR (600)

4. Chemistry - Study and Teaching

7. Results of entrance examinations in chemistry, Khim. v shkole, no. 1, 1953.

9. **Monthly** **List** **of** **Russian** **Accessions**, Library of Congress, _____May_____ 1953. Unclassified.

STECHKINA N.A.

SAKHAROV, V.M.; STECHKINA, N.A.

Experimental construction of reinforced concrete water drain collecting mains using the compression method. Gor.khoz.Mosk. 28 no.3:22-25 Mr '54.
(MLRA 7:6)

(Culverts)

KOZLOVSKIY, A.A.; SVETINSKIY, Ye.V.; STECHKINA, N.A.

Ramming unit on a MRSK-100 erecting crane base. Osn., fund.
i mekh. grun. 5 no.4:18-20 '63.   (MIRA 16:11)

STECHMILER, R.

"Josef Bozek, An Outstanding Czech Explorer." p. 158 (Strojirenstvi, Vol. 3,
no. 2, Feb. 1953, Praha)

SO: Monthly List of East European Accessions, Vol. 3, no. 2, Library of Congress,
Feb. 1954, Uncl.

STECHMILLER, R.

"Commemorating the Anniversary of Joseph Ressel's Birth." p. 556, Praha, Vol. 3, no. 7, July 1953.

SO: East European Accessions List, Vol. 3, No. 9, September 1954, Lib. of Congress

STECHTLER, R.

PROVENIENCE OF THE MECHANIC Josef Bozek. P. 22.
(SBORNIK PRO DEJINY PRIRODNICH VED A TECHNIKY, vol. 1954, Praha)

SO: Monthly List of East European Accession,(EEAL), LC, Vol. 4, No. 11,
Nov. 1955, Uncl.

STECHMILER, R.

The National Technological Museum of the people. p.12. (Technicke Noviny, Praha, Vol 2, No. 20, Oct 1954)

SO: Monthly list of East European Accessions (EEAL), LC Vol 4, No. 6, June 1955, Uncl

STECHMILER, R.

"Two hundred years of Divis' lightning rod." (p.105). "Where our television sets originate." (p.106). VEDA A TECHNIKA MLADEZI. (Ceskoslovensky svaz mladeze) Praha. No. 4, 1954.

SO: East European Accessions List, Vol. 3, No. 8, Aug 1954.

STECHMILLER, R.

"History of the Tatra Automobile Plant." p. 380, Praha, Vol. 4, no. 5, May 1954.

SO: East European Accessions List, Vol. 3, No. 9, September 1954, Lib. of Congress

STECHMILER, R.

Aeronautics in the Technological Museum in Prague.   p.8.   (SKRZYDLATA POLSKA, Warszawa,
Vol. 11, No. 11, Mar. 1955)

SO: Monthly List of East European Accessions, (EEAL), LC, Vol. 4, No. 6, June 1955,
Uncl.

STECHMILER, R.

STECHMILER, R. Universal character of our technology. p. 11

Vol. 4, no. 10, Oct. 1956
POZEMNI STAVBY
TECHNOLOGY
Praha, Czechoslovakia

So: East European Accession Vol. 6, no. 2, 1957

STECHMILER, R.

STECHMILER, R.   Cultural and educational activities of the National Technological
            Museum.   p. 93

Vol. 4, no. 10, Oct. 1956
POZEMNI STAVBY
TECHNOLOGY
Praha, Czechoslovakia

So: East European Accession Vol. 6, no. 2, 1957

"Technoindustrial an financial plan; a plan for deep-mine production."
Uhli, Praha, Vol 3, No 6, June 1953, p. 174

S: Eastern European Accessions List, Vol 3, No 10, Oct 1954, Lib. of Congress

FIEBIG, Adolf; BARTECZKO, Izabella; STECHNIJ, Irena

Studies on methods used in pharmaceutic practice for the increase
of microbial contamination of drugs.   Acta pol. pharm. 28 no.5:435-
440 '61.

1. Z Zakladu Farmacji Stosowanej Akademii Medycznej w Gdansku
Kierownik: dr A. Fiebig i z Apteki Panstwowego Szpitala Klinicznego
Nr 1 w Gdansku Kierownik: mgr J.Lewonowa.
              (DISINFECTION)   (DRUGS)

STECIAK, T.

Country	:	Poland	E-2
Category	:	Analytical Chemistry. Analysis of Inorganic Substances	
Abs. Jour.	:	Ref. Zhur.-Khimiya No. 6, 1959	19155
Author	:	Czakow, J.; Steciak, T.	
Institut.	:	INST. NUCLEAR RESEARCHES PAN, WARSAW	
Title	:	Spectrographic Determination of Trace-Amounts of Boron and Silicon in Ammonium Fluoride.	
Orig Pub.	:	Chem. analit., 1957, 2, No 5, 426-435	

Abstract : Analysis is carried out by the method of addition, on excitation of spectra in an alternating current arc at 20 a. Spectra are photographed in a medium spectrograph. On assuming that γ of plate, and exponent in the formula $I = ac^b$, are equal to 1, the unknown concentration is found on the calibration graph plotted with coordinates C_x, $(A_f / A_{1+f}) - 1$, where A_f -- magnitude of deflection of galvanometer mirror on measurement of background blackening; A_{1+f} -- same, for line. On determination of B at concentrations $5 \cdot 10^{-5} - 3 \cdot 10^{-4}\%$, the analyzed NH_4F is converted to NaF. The sample is divided in 4 parts and 3 of these are combined, respectively, with 2.4 and 8 ml of H_3BO_3 solution

Card: 1/3

Category	:
Abs. Jour.	:
Author	:
Institut.	:
Title	:
Orig. Pub.	:

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19155

Abstract : containing 2.25 γ/ml of B. After evaporation the powders are placed in a Cu-electrode with aperture 3 mm in diameter and 5 mm deep. Upper Cu-electrode is cut to a planar tip. Inter-electrode gap 3 mm; exposure 1 minute, the sample-containing electrode is changed after 30 seconds. B is determined by 2497.73A line, background on greater wavelength side is used as internal standard. Reproducibility of B determination is characterized by error of $\pm$ 14%. On determination of Si at concentrations $5 \cdot 10^{-3} - 2 \cdot 10^{-2}\%$ use is made of carbon electrodes with aperture 4 mm in diameter and 5 mm deep. Upper electrode cut to a planar tip;

Card: 2/3

E-38

STECIAK, Teresa

Spectrographic determination of trace amounts of In and Tl in silicate ores
and minerals using the direct method.   Chem anal 7 no.2:503-508 '62

1. Department of Analytic Chemistry, Institute of Nuclear Research Polish
    Academy of Sciences, Warsaw.

MINCZEWSKI, Jerzy; MALESZEWSKA, Hanna; STECIAK, Teresa

Spectrographic determination of gallium and indium by extraction.
Chem anal 7 no.4:791-802 '62.

1. Department of Analytical Chemistry, Institute of Nuclear
Research, Polish Academy of Sciences, Warsaw.

STECIC, L.

Workers' management and distribution of income. Elektroprivreda 14
no.7/8:391-392   Jl-Ag '61.

Stecki, Jan

CII

Heteroazeotropism in two component strictly regular solutions. Jan Stecki (Univ. Warsaw). *Roczniki Chem.* 29, 951-6(1955)(in English summary).—The compn. (x) and vapor pressure of the heteroazeotrope were calcd. for the strictly regular soln. The mole fraction of the component B, y_B is given by $p_B^o/(p_B^o + p_A^o)$, where p_A^o and p_B^o denote the vapor pressures for pure components A and B. The relation also holds when the energy of mixing is symmetrical in the components. At the point of transformation of hetero- into homoazeotrope, the values of derivs. of the compn. with respect to temp. were not equal.   P. D.

STECKI, J

Classification of binary systems with limited mutual solubility. W. Swietoslawski, K. Zieborak, and J. Stecki (Polish Acad. Sci., Warsaw). *Bull. acad. polon. sci.*, Classe III 4, 97–9(1956)(in English).—A classification is given of binary systems in which there is partial miscibility in the 2 liquid phases. The discussion embraces (1) changes with pressure of various equil. diagrams of a single system, and (2) the changes at const. pressure if one of the components is replaced by its homologs.   A. Kreglewski

STECKI, J.

2

532.612
J.Stecki.

5912.   ON SURFACE TENSION OF IDEAL SOLUTIONS.
Acta phys. Polon., Vol. 15, No. 4, 267-9 (1956).
An equation presented by Mierzecki (Abstr. 7182/1956) is
questioned by the author of the present letter. It is claimed that the
theoretical assumptions are unsound and a short critical review of.
the problem generally is then given. Association and the influence
of complexes is considered important, it being thought that a suitable
model would be similar to Prigogine's associated solution model.
                                                      T.C.Toys

MT

Heteroazeotropic binary systems. III. Series of (A,H_i) systems formed by regular solutions. J. Stecki (Polish Acad. Sci., Warsaw). *Bull. acad. polon. sci.* Classe III, 5, 101-9(1957)(in English); cf. *C.A.* 50, 6119g; 51, 1670e.—B.p. isobars and condensation curves of a series of systems (A,H_i) (cf. preceding abstr.) forming regular mixts. are discussed, in the case of partial miscibility of components, with particular reference to the possibilities of various types of liquid-vapor const.-pressure equil. diagrams. If the crit. soly. temp. is even a little higher than the b.p. of the lower-boiling component, the b.p. isobar of the binary system should have a horizontal section.

J. Stecki

Stecki, J.

POLAND/Physical Chemistry - Thermodynamics, Thermochemistry, Equilibria,   B-8
          Physical-Chemical Analysis, Phase Transitions.

Abs Jour: Referat. Zhurnal Khimiya, No 2, 1958, 3770.

Author : J. Stecki.
Inst   : Academy of Sciences of Poland.
Title   : Heteroazeotropic Ternary Systems. I.

Orig Pub: Bull. Acad. polon. sci., 1957, Cl. 3, 5, No 4, 421-427, XXXIII.

Abstract: The general conditions determining the position of the hetero-
           azeotropic line and the composition of the 3-component hetero-
           azeotrope in partly mixing systems are described. Systems are
           discussed, in which one pair of liquid components (1, 3) does
           not mix at all, while two fundamental pairs (1, 2) and (2, 3)
           produce 2-component systems mixing in all proportions. It is
           assumed that the homogenization may be neglected in a 3-compo-
           nent system in the concentration range from the side of the
           1-3 concentration triangle up to the heteroazeotropic line

Card   : 1/2   -17-

_____. A series of inequalities is derived, these
inequalities include the composition of 2-component azeotropes,
of the 3-component heteroazeotrope and of liquid phases produc-
ing the heteroazeotrope.

Card   : 2/2   -18-

B-8

COUNTRY   : Poland
CATEGORY   :

ABS. JOUR.   : RZKhim., No. 5 1960, No.   16918

AUTHOR   : Stecki, J.
INST.   : Not given
TITLE   : On the Heteroazeotrope-Homoazeotrope Transition
               Point

ORIG. PUB.   : Roczniki Chem, 32, No 5, 1139-1144 (1958)

ABSTRACT   : The author discusses the transformation of a heter-
               oazeotrope into a homoazeotrope. On the basis of
               general thermodynamic considerations, relation-
               ships are derived which hold at the heteroazeotrope
               -homoazeotrope transition point and correlate the
               slopes of the three lines intersecting at the trans-
               ition point: (1) the line expressing the change
               in the homoazeotrope composition with temperature,
               (2) the line expressing the change in the composi-
               tion of the vapor in equilibrium with the two

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CARD: 1/2

16918

CATEGORY   :

ABS. JOUR.   : RZKhim., No. 51960, No.

AUTHOR   :
INST.   :
TITLE   :

ORIG. PUB.   :

ABSTRACT   : liquid phases, and (3) the line expressing the
               temperature dependence of the solubility (turbidity
               line). It can be seen from these relationships
               that the curve representing the change in the va-
               por composition in the three-phase system must fall
               between the homoazeotrope and the turbidity lines
               on the diagram. Simplified relationships for the
               case of regular solutions in equilibrium with an
               ideal vapor phase are discussed.
                                        From author's summary

CARD: 2/2

STECKI, J.

On the contributions of nonspecific interactions to the thermo-
dynamic properties of associated solutions. Bul Ac Pol chim 7 no.1:
51-54 '59.   (EEAI 9:7)

1. Institute of Physical Chemistry, Polish Academy of Sciences.
Presented by W.Swietoslawski.
        (Solutions)   (Mixtures)   (Chemical equilibrium)

STECKI, J.

A simple lattic model of a regular associated solution which accounts for nonpolar
interaction. p. 255.

ROCZNIKI CHEMII. (Polska Akademia Nauk) Warszawa, Poland, Vol. 33, no. 1, 1959.

Monthly list of East European Accessions (EEAI) LC, Vol. 8, no. 9, September 1959.
Uncl.

STECKI, J.

Excess functions of a series of binary systems of the type (A,Hi).
Bul chim PAN 9 no.3:151-154 '61.

1. Institute of Physical Chemistry, Polish Academy of Sciences.
Presented by W. Swietoslawski.

(Functions)   (Systems(Chemistry))

BELLEMANS, A.; STECKI, J.

Molecular theory of electrostatic interaction between ions in a
solvent. I. General formalism. II.General Formalism. III. Non-
polar systems. Bul chim PAN 9 no.5:339-354 '61.

1. University of Brussels, Brussels and Institute of Physical Chemistry,
Polish Academy of Sciences. Presented by W. Swietoslawski.

(Electrostatics)   (Ions)   (Solvents)
        (Systems(Chemistry))

STECKI, J.

Molecular theory of electrostatic interactions between ions in a solvent. IV. non-polar solvents. V. Volume exclusion effects and an application to the free energy of charging a single ion. Hard-sphere ions in non-polar solvents. Bul chim PAN 9 no.6:429-440 '61.

1. Institute of Physical Chemistry, Polish Academy of Sciences.
W. Swietoslawski.

STECKI, J.

Molecular theory of electrostatic interactions between ions in a solvent. VI. Polar solvents of non-polarizable molecules. VII. Rigid-lattice solvent of point non-polarizable dipoles. Bul chim PAN 9 no.7: 483-493 '61.

1. Institute of Physical Chemistry, Polish Academy of Sciences. Presented by W. Swietoslawski.

STECKI, J.

Molecular theory of electrostatic interactions between ions in a solvent. VIII. Effect of dielectric saturation on the potential of average force between two ions in a dipolar solvent. IX. Free energy of charging single ion in a polar solvent of a rigid lattice of point non-polarizable dipoles. Bul chim PAN 9 no.10:663-678 -1961

1. Institute of Physical Chemistry, Polish Academy of Sciences.

(Electrostatics)

K-2

POLAND / Forestry. Dendrology

Abs Jour: Ref Zhur-Biol., No 13, 1958, 56372

Author : Stecki K., Szulc H.

Inst   : Not given

Title   : Old Yew Trees

Orig Pub: Chronmy przyr. ojez., 1957, 13, No 2, 3-12

Abstract: Thirteen samples of yew-trees, located in Poland, are described. The circumference of their trunk at chest level varies from 2.5 to 5.06 meters. They attain 500-750 years in age.

Card 1/1

STECKI, Konrad, mgr inz.; ZYMELKA, Franciszek, mgr.

Mechanical production of etched stencils. Przegl. geod. 36
no.2:46-48   F'64

STECKI, Konstanty (Poznan)

The way our insect-eating plants catch their victims.
Wszechswiat no.12:276-280 D'63.

STECKI, Z.

Let us discuss the problem of training cadres. p. 10.
(Las Polski, Warszawa, Vol. 30, no. 9, Sept. 1956.)

SO: Monthly List of East European Accessions (EEAL) LC, Vol. 6, no. 7, July 1957. Uncl.

COUNTRY   :   Poland   K
CATEGORY   :   Forestry. Forest Cultures.

ABS. JOUP.   :   RZhBiol., No. 4: 1959, No. 15509

AUTHOR   :   Stecki, Zbigniew
INST.   :
TITLE   :   Practices of Poplar Cultivation in Kurniko.

ORIG. PUB.   :   Las polski, 1957, 31, No.24, 7-9

ABSTRACT   :   Preliminary results are offered on the work
                   of poplar hybridization at the Institute of
                   Dendrology and Pomology in Kurniko (Poland),
                   where the poplar collection is represented by
                   190 species and varieties. From 1950 - 1957
                   230 interbreedings were accomplished, of which
                   125 proved successful. Hybrids from the in-
                   terbreeding of Populus canescean with other
                   poplars were outstanding for their poor qual-
                   ity. It was demonstrated that the tapering

CARD: :   1/3

31

Stand and role of spruce in the forests of the Masurian Lakes area. p. 55

SYLWAN. (Wydzial Nauk Rolniczych i Lesnych Polskiej Akademii Nauk i Polskie
Towarzystwo Lesne) Warszawa, Poland. (Journal on forestry issued by the
Section of Agricultural and Forestry Sciences, Polish Academy of Sciences;and the
Polish Society of Forestry; with English and Russian summaries. Includes
supplements: Biuletyn Instytutu Badawczego Lesnictwa, bulletin of the Forest
Research Institute; Biuletyn Instytutu Technologii Drewna, bulletin of the Institute
of Wood Technology; Przeglad Dokumentacyjny Drzewnictwa, documentation of the
Institute of Wood Technology; and Przeglad Dokumentacyjny Lesnictwa,
documentation of the Forest Research Institute. (Monthly)
Vol. 191, no. 1, Jan 1957

Monthly List of East European Accessions (EEAI), LC, Vol. 8, no. 6, June 1959
Uncl.

STECKI, Z.

Problems of systematic cultivations inside the genue of poplars <u>Populus</u> L.
p. 63.

WIADOMOSCI POTANICZNE.   (Polskie Towarzystwo) Krakow, Poland.
Vol. 3, no. 2, 1959.

Monthly List of East European Accessions (EEAI) LC, Vol. 9, no. 1, Jan. 1960.

Uncl.

STECKIEWICZ, C.

"Inportance and application 6f the coefficient of soil bearing capacity K to the
designing of roads and airfields." Bulletin, p. 31A (INZYNIERIA I BUDOWNICTWO,
Uol. 9, no. 11, Nov. 1952 Warszawa, Poland.)

SC: Monthly List of East European Accessions, Vol. 2, #8, Library of Congress
     August, 1953, Uncl.

STECKIEWICZ, C., doc. mgr. inz.

An obituary on Stanislaw Jachimowski. Sylwan 56 no.1:85-86 Ja-F '62.

1. Kierownik Katedry Inzynierii, Wydzial Lesny, Szkola Glowna
Gospodarstwa Wiejskiego, Warszawa.

Synthetic and technical ... gravels in road construction. p. 95

Drogi i Mosty vol. 1), no. 4, apr. 1956

Poland

So. ... Monthly List of ... Accessions (Library ... vol. 5, no. 13 Oct. 1956

STECKIEWICZ, C.

Contributions to the problems of studies and calculations of elastic pavements. p. 1
(DROGOWNICTWO, ol. 12, No.2, Feb. 1957, Warsaw, Poland)

SO: Monthly List of East European Accessions (EEAL) LC, Vol. 6, No. 9, Sept . 1957
                                                                Uncl.

STECKIEWICZ, I.

"We shall not overheat the infants", p. 7, (ZDROWIE, Vol. 5, No. 6, 1953, Warszawa, Poland)

SO: Monthly List of East European Accessions, L.C., Vol. 3, No. 4, April, 1954

STUCKIEWICZ, I.

"When you have a headace!", p.2, (ZDROWIE, Vol. 5, No. 8, 1953, Warszawa, Poland)

SO: Monthly List of European Accessions, L.C., Vol. 3, No. 4, April, 1954